

From a commanding position on Victoria Quay, the life-size bronze statue of Charles Yelverton O'Connor maintains a constant vigil over his first major engineering achievement in Western Australia — Fremantle Harbour.

The statue faces away from the hills east of Perth where O'Connor was to undertake a scheme of even more noble proportions that would revolutionise life in the Goldfields but end his own.

O'Connor was to design and, for the most part, guide the construction of the Goldfields water supply scheme.

Shortage of water was an enormous drawback for prospectors who rushed to the arid goldfields around Kalgoorlie in the 1890s.

The problem was overcome with the opening of a water pipeline from Mundaring Weir in the hills, near Perth to Kalgoorlie.

Charles Yelverton O'Connor was the man responsible for this outstanding feat of water supply engineering, a project that would stamp him as one of the greatest engineers of our time.

The Man

If gold was the catalyst for early development in Western Australia, it was the catalyst too for O'Connor's career.

His working life was inextricably linked with discoveries of gold, first in New Zealand and later in Western Australia.

C. Y. O'Connor was born in County Meath, Ireland. At 16 he chose engineering as his vocation and, after Dublin University, went on to work as a railway construction engineer.

Gold had just been discovered in New Zealand. When O'Connor heard the news he made one of the most important decisions in his life — to emigrate.

O'Connor's work in New Zealand took him to one of the top positions in the country, marine engineer for New Zealand. As such, he was responsible for the overall supervision of marine and public works.

Falling gold prices and a shortage of money forced the New Zealand Government to curtail some of their works expenditure. Following a disagreement with the Government, O'Connor resigned and moved his family to Western Australia where, in 1891, he was appointed Engineer-in-Chief of Public Works and Manager of Railways.

Western Australia was a small colony with big problems. The first O'Connor faced as Engineer-in-Chief was to build a suitable harbour.

He tackled the project in his usual determined manner. Eventually, in November 1892, Lady Robinson, wife of the Governor, Sir William Robinson, pulled the handle which tipped the first load of stones on Rous Head to commence construction of North Mole.



Fremantle Harbour

The Gold

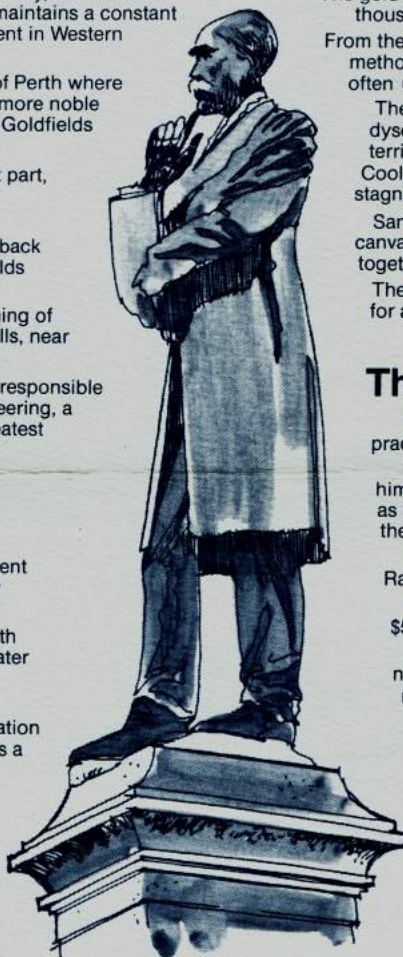
While O'Connor went ahead with the Fremantle Harbour works and major railway initiatives, gold discoveries were rocking the colony.

At the time, no one could foresee the tremendous bearing that gold would have on the economy of Western Australia or that the discoveries would make O'Connor author of one of the most important chapters in the story of water supply in Australia.

Gold was first discovered in the Kimberleys in 1885 with subsequent discoveries in the Yilgarn, Pilbara and Murchison.

However, the discovery of gold by Bayley and Ford at Coolgardie in 1892, followed by Paddy Hannan's find at Kalgoorlie in 1893 led to a mining boom from which developed the world famed Golden Mile.

These discoveries focused attention on Western Australia's gold producing potential and enticed prospectors from all parts of the colony and overseas.



The gold rush at Kalgoorlie saw the population soar as thousands flocked to the fields to seek their fortune.

From the start the lack of water was a major problem. Early methods of supply were expensive, cumbersome and often unreliable.

The human cost was high. Diseases like scurvy, dysentery and allied complaints were common. The terrible typhoid epidemic which killed hundreds at Coolgardie was caused by diggers drinking from the stagnant Coolgardie Gorge during a drought period.

Sanitation was primitive and most miners lived in canvas or hessian huts or anything that could be held together to form some protection from the heat.

These unsavoury conditions brought about agitation for a water supply.

The Project

In 1895, C. Y. O'Connor was asked to produce a practical plan for pumping water to the goldfields.

The task was enormous but O'Connor proved himself a master by designing what today is classed as one of the greatest hydraulic engineering works in the world.

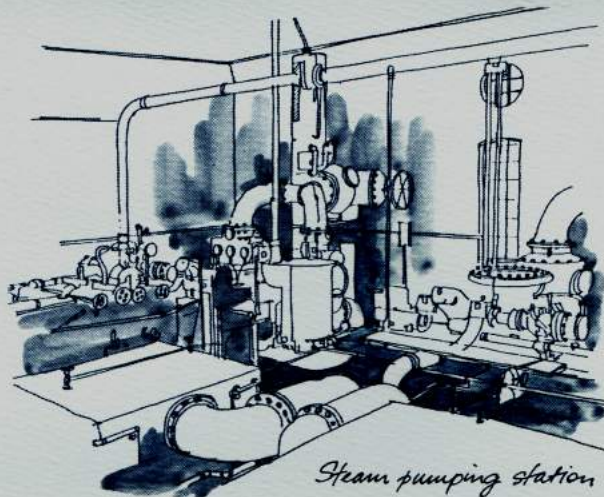
The idea was to impound water in the Darling Range and pump it in successive lifts to Kalgoorlie.

In 1896, approval was given by Parliament to raise \$5 million to finance the scheme.

For two years, no actual work was undertaken, nor was the loan raised because of shortage of money on the market. But planning went ahead.

With characteristic thoroughness and imaginative genius, O'Connor evaluated the various alternatives of providing an assured water supply. He discarded the stop gap short term proposals such as deep boring or local surface storage that were promoted by the local leaders and proposed instead his ingenious scheme to pipe water from a coastal storage to the goldfields.

The enormous task of providing water for the goldfields, which was rightly hailed at the time as a unique technological triumph, involved the construction of a 21 million cubic metre storage reservoir in the Darling Range near Perth and the pumping of water by eight major steam driven pumping stations through a 557 km long steel pipeline.



Steam pumping station

Water was to be lifted 340 m from Mundaring Reservoir to Coolgardie. It is believed that the hydraulics of this scheme both in terms of length of the pipeline and the height of the lift of water surpassed any scheme in existence at that time.

Some idea of its magnitude can be gained from the fact that if the pipeline began not at Perth, Western Australia, but at Perth, Scotland, it would end in London.

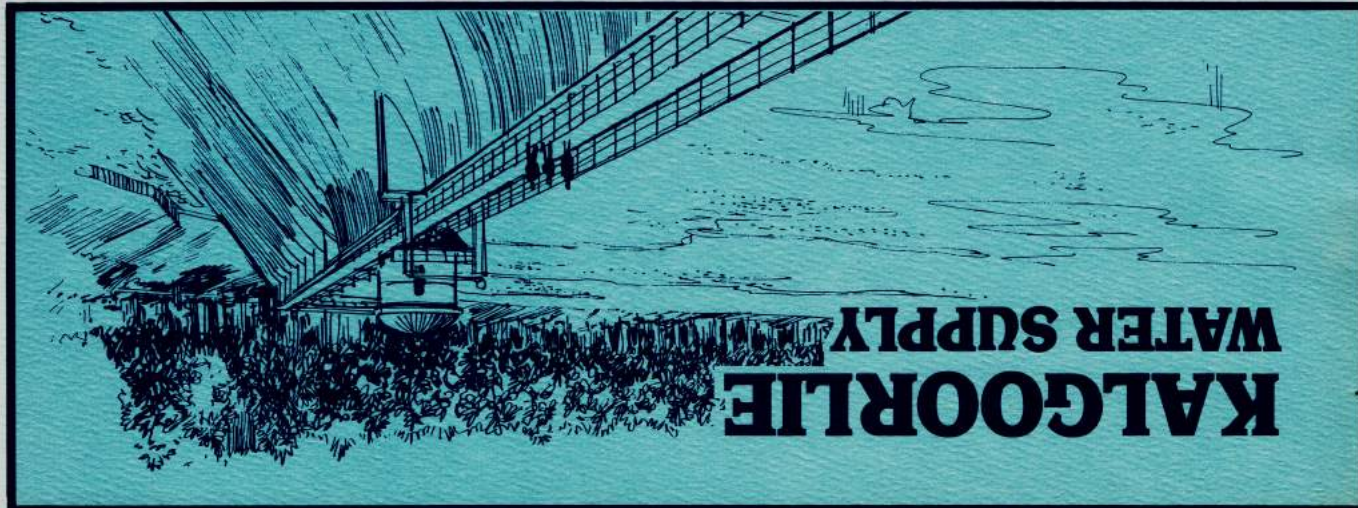
For O'Connor, it was a time of trial and tribulation. He came under severe criticism. His scheme was variously described by the Press and in other quarters as foolhardy, impracticable and a waste of public money.

Work began in 1898, and by early 1902 the weir was nearing completion. The laying and joining of pipes, which began in March, 1901, was also progressing.

The project was beset with enormous difficulties and frustrations. There were continual delays because most of the engineering supplies had to be brought from London.

The fierce criticism and the strain finally proved too much for O'Connor, and sadly he took his own life at South Fremantle.

In March, 1902, a few weeks after O'Connor's death, pumping trials began. On April 18, the water reached Northam and as each section of the pipeline was completed, the water followed; Merredin on August 22, Southern Cross on October 30, and finally on



December 22, the water reached Coolgardie.

By January 16, 1903 it was ready to be supplied to the people of Kalgoorlie. The whole period of construction had been less than five years.

The pumping machinery at Mundaring Weir was officially started during an opening ceremony on January 22, 1903.

Two days later, Sir John Forrest (then Minister for Defence and former Premier of Western Australia) turned the guiding wheel of a valve to officially open the Goldfields water supply scheme at Coolgardie. Later the same day Sir John performed a similar ceremony at Mt Charlotte reservoir in Kalgoorlie.

The goldfields had water.

The Pipeline

C. Y. O'Connor's pipeline was constructed of 762 mm diameter steel pipes manufactured on the locking-bar principle. This method of construction was invented by Mephan Ferguson, a Melbourne engineer. Single steel sheets 8.5 metres long were rolled into half pipe sections and joined together along the longitudinal edge by an "H" shaped locking bar which was pressed onto the edge of the rolled sheets. The pipes were joined together with lead packed jointing rings and buried in trenches in the ground.

Extensive alterations and enlargements have been made over the years. With the development of improved welding techniques it has been possible to eliminate all the lead packed joints. The pipes are now welded and form a continuously welded line which is mounted on concrete blocks above the ground.

The main is now laid in duplicate over some sections and varies in size between 1,220 mm and 600 mm diameter.

The original pipe line was uncoated internally and externally. The main is now concrete lined internally and coated externally with tar and aluminium paint to prevent corrosion. A more recent development, which is applied to all new pipes, is the coating of the pipes externally with metallic zinc.

O'Connor Museum

Standing only a few metres from the overflow waters of Mundaring Weir, the old No. 1 Pumping Station of the Goldfields Water Supply was considered an ideal location for an historical museum.



In 1961 the Western Australian Tourist Development Authority decided to utilize the original pumphouse building to depict the early struggles and successes of the pioneers of the State. The museum graphically portrays the history of gold discoveries in Western Australia, the urgent need for water and the subsequent building of the pipeline to the Goldfields and the life of C. Y. O'Connor.

When the museum project was commenced, the old pumping station was derelict, having been replaced in 1955 by an electrically operated station. It had been untouched for seven years, its walls were flaking, windows were broken and dust and grime lay thickly on the oil-stained wooden floor.

Of the three pumping units, two were removed and the original Worthington-Simpson No. 1 engine was cleaned and restored to its former condition.

The overall display comprises photographs of relics from early gold mining days and crude equipment used in the search for gold, together with photographs showing the towns of Kalgoorlie and Boulder in the grip of gold fever. Also shown are photo copies of old documents, newspaper criticisms of the pipeline project and personal attacks on its engineer. Models and diagrammatic presentations of the locality, a typical underground mine and extensions of the comprehensive water scheme are shown.

The O'Connor Museum was opened by the Premier of Western Australia, the Hon. David Brand, M.L.A., on 25th March, 1964, and today stands as a tribute to the early pioneers of the State.

Monument

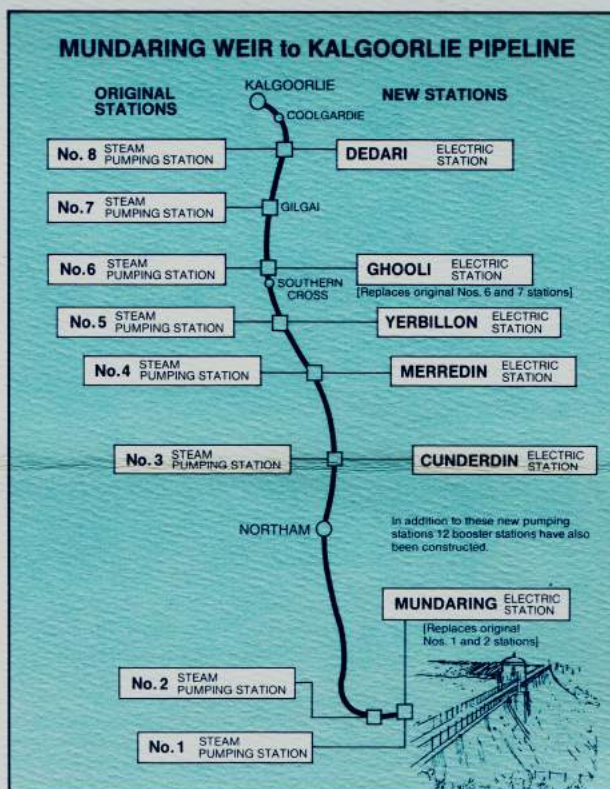
Development of the State's agricultural areas and an expanding sheep and stock industry were made possible by extending the water supply built originally for the goldfields.

Today, the Goldfields, Country Towns and Agricultural Areas Water Supply Scheme stands as a monument to the foresight of the statesmen at the turn of the century and to the engineering skills and determination of the designer and builder of the scheme.

C. Y. O'Connor was the architect of the scheme but great credit is also due to the statesmen who made it possible.

In particular the faith shown in the project and the support given by the then Premier, Sir John Forrest, played a major role in the scheme being adopted.

When he officially opened the scheme in 1903, Sir John said: Future generations, I am certain, will think of us and bless us for our far seeing patriotism, and it will be said of us, as Isaiah said of old, "they made a way in the wilderness and rivers in the desert."



Water Authority
of Western Australia